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ANNUAL MEETING OF ACADEMY OF SCIENCES USSR

[Comment: This report presents information from the opening speech at the annual meeting of the Academy of Sciences USSR, given by A. N. Nesmeyanov, president of the Academy, on 2 February 1955. The speech reviews past accomplishments of the academy, and discusses present and future development.]

Last year saw the further development of the Academy of Sciences USSR, and the expansion of its work in many fields. This is evidenced by the organization of new, independent scientific establishments of the academy, such as the Electrophysical Laboratory, which is a large institute with completely unique equipment, the Institute of Semiconductors, the Laboratory of Super-High Pressures, and the Institute of Complex Transport Problems. It is also reflected in the development of the work of such existing scientific establishments as the Institute of Electronics and Radio Engineering, the Institute of Organoelemental Compounds the Institute of Biological Physics, the Institute of Scientific Information, and the Division of Applied Mathematics of the Mathematics Institute imeni V. A. Steklov. Of these establishments, only the Institute of Biological Physics is not yet engaged in full-scale scientific activity.

The growth of the peripheral establishments of the academy was expressed by the transformation of the Kirgiz Affiliate of the Academy of Sciences USSR into the Academy of Sciences Kirgiz SSR and by the strengthening of the scientific work of other affiliates, especially the Ural and Kazan' affiliates, and by the completion of the Crimean Astrophysical Observatory in Simeiz.

The strengthening and broadening of the scientific work of the academy also found expression in the increased productivity of long-established institutes. In particular, production of the academy press rose significantly. In 1953, the academy press published 15,000 "authors' lists" (avtorskiy list) [a unit of measure applied to printed matter and comprising a set of 40,000 symbols, letters, numbers, etc., in the text, used to determine authors' fees]. The Academy press published 18,600 authors' lists during 1954, and 25,000 are planned for 1955. Even this large number of publications will not satisfy all requirements. The output of academic works by nonacademic presses will have to be increased and a limitation introduced on the number of reissues and anniversary collections. Various nonperiodic publications of numerous institutes will have to be converted to periodic issues, and material for publication will have to be selected more stringently.

During 1954, great efforts were made in developing investigations in the field of nuclear physics in the USSR, significant quantities of material means were made available, and talented scientists were attracted to nuclear research. The institutes and scientists of the Academy of Sciences USSR made important contributions in this field. Last year, work was done on accelerators and similar apparatus, cosmic ray particles, the study of the mutual action of particles of various energies with atomic nuclei, nuclear reactions, the propagation of mesons, and in the investigation of the properties of elementary particles. New efforts and investments in this rapidly developing field of science will be required in the near future.

The Academy must first of all direct its attention to the future growth of theoretical physics research. In this field, a few definite successes have been registered, including development of the theory of the interaction of mesons with nucleons, and the theory of the interaction of elementary particles with very high energies ( $10^{15}$  to  $10^{17}$  electron volts). Theoretical physics in the USSR must be developed in every possible way. The conduct of nuclear experiments on a contemporary level should be made possible in many other cities of the USSR.

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While intensely developing nuclear physics as one of the most fundamental points of the growth of knowledge in the middle of the 20th Century, other important branches of physics should not be disregarded. These include radio-physics, to which Academician P. L. Kapitsa recently made some new and quite significant contributions, and the physics of semiconductors. In the latter field, the allied study of the thermal and electrical properties of semiconductors at the Institute of Semiconductors, under the direction of Academician A. F. Ioffe, has led to the creation of perfected thermoelements, for which the possibilities of technical utilization appears very bright.

In the field of physics and its technical applications, scientific establishments of the academy contribute largely to the growth of this science. The necessary material conditions for each of these establishments must be provided.

In 1955, the creation of a Calculation Center, equipped with modern computers, will greatly improve conditions under which mathematicians work.

The completion of the work on the Pulkovo observatory, and the completion of the construction of the observatory in Partizanskiy (in the Crimea), will aid the Soviet astronomers by providing them with powerful instruments. The new Bureau of the Department of Physicomathematical Sciences is expected to coordinate the activities of the scientists and scientific establishments under its control.

In the field of chemistry, despite important achievements in the study of transuranium elements and the chemistry of rare earths, the chemistry of numerous rare elements is not sufficiently developed. More amicable and intensive development of the problems of catalysis is needed. Recently, the academy's work was improved in the field of high molecular compounds. However, this important part of chemical science requires much more intensive development. The chemistry of natural compounds such as antibiotics, vitamins, hormones, alkaloids etc., is completely unsatisfactory. There has long been a need for an Institute of Natural Compounds. Some discomfort has been caused by the withdrawal of both of the physicochemical institutes from the cardinal problems of physical chemistry and the concentration of their work, to a significant degree, either on inorganic chemistry or physics and on applications of physical chemistry, such as questions of corrosion. The thorough development of theoretical and experimental physical chemistry is necessary particularly in kinetics catalysis, electrochemistry and quantum chemistry.

The numerous institutes of the Department of Biological Sciences have been operating successfully. Along with the institutes of biological physics and biochemistry imeni A. N. Bakh, the Institute of Plant Physiology imeni K. A. Timiryazev has been carrying on interesting work in the use of tracer atoms to study metabolic phenomena in organisms. A number of institutes are continuing their investigation and cataloguing of the flora and fauna of the USSR. Many institutes and commissions are helping to utilize virgin land, increase agriculture and fishing production, and solve important problems of health preservation. The academy is obligated to give the most energetic help to agricultural production.

In addition, experimental biology, in particular in fields allied with chemistry and physics must be advanced. It must be admitted that operations in the field of biochemistry and biophysics are still insufficient and that operations are still very limited in microbiology and cytology. Investigations in various fields of the physiology of animals, man, plants and microbes must be broadened.

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The academy must develop mathematics, physics, chemistry and biology as much as possible as a foundation for natural science and technology.

In the technical sciences the successfully increased activity of the Institute of Automatics and Telemechanics should be noted. The Department of Technical Sciences should concentrate on developing new technology involving automation, radio engineering and electronics, and on the development of power engineering.

The unsatisfactory methods of planning scientific work have been mentioned frequently. Unfortunately, the plans of the academy are a result of "intergrating" proposals, made by each scientific field individually. Such planning tends to lock the academy within the circle of scientific interests of its own establishments.

During 1954, the first, and hence incomplete, new experiment in the planning of scientific work was undertaken. The presidium of the academy assigned a group of competent scientists and outstanding scientific industrialists to plan the development of the most important problems in each field of science. Thus far, work has been completed on 70 percent of these problems in the natural and technical sciences. In each problem, the state of the science was analyzed, the goals and courses of solution noted, establishments set up, and lines of cooperation and demarcation defined.

Of these problems, the presidium has chosen 11 for direct observation and control at the locations indicated: high-power electronics, Institute of Physical Problems imeni S. I. Vavilov; high-speed digital machines, Institute of Precision Mechanics and Calculating Technology; semiconductors and their technical application, Institute of Semiconductors, scientific bases for the selection of catalysts and the search for catalysts for reactions of practical importance, Institute of Organic Chemistry imeni N. D. Zelinskiy; basic biological functions of protein substances, Institute of Biochemistry imeni A. N. Bakh; direction of the exchange of substances of microorganisms designed to intensify microbiological processes in industry and agriculture, Institute of Microbiology; processing alloys with special properties for new fields of technology, especially heat-stable and other special alloys and questions of their stability, Institute of Metallurgy imeni A. A. Baykov; raising the effectiveness and dependability of radio engineering apparatus and electronic instruments, Institute of Radio Engineering and Electronics; principal problems of theoretical physics, Physics Institute imeni T. M. Lebedev; aiding the development of automation and telemechanization of production processes, Institute of Automatics and Telemechanics; working out scientific bases for the development of power engineering systems and their combination by a single high-voltage net, Power Engineering Institute imeni G. M. Krzhizhanovskiy.

In the present organization of the academy, there is a disproportionate preponderance of academy institutes in Moscow, as compared to the small number of its peripheral establishments. If Leningrad is not counted, the remaining non-Moscow network of scientific establishments of the academy is almost entirely concentrated in the affiliates. Affiliates should be located only where specific natural or national problems exist.

The USSR cannot count on occupying leading position in science if the whole country does not participate in high-level scientific work with scientific establishments in many large cities. For this reason, it seems desirable in the future not to create new affiliates on the periphery but rather separate institutes of the academy, bearing in mind the organization of strong scientific establishments on a high level.

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For example, in such a large industrial city as Gor'kiy, the academy has no scientific institutes. The organization in Gor'kiy of a Radiophysics Institute of the Academy of Sciences USSR has now been proposed. Another such new peripheral institute of the academy will be the Institute of the Biology of Reservoirs, which is being created from "Borok" Scientific - Research Biological Station on Rybinsk Reservoir. The Electrophysics Laboratory, mentioned before, has already been constructed far from Moscow. In the future, many new scientific institutes will have to be created in the field of physics, chemistry, and the biological sciences. The fact that more than one establishment will, at times, be active in certain especially important branches of science must be of no concern. The faster the progress, the less monopoly there will be in science, the more varied the points of view and the more rapid and full the attainment and utilization of scientific fact.

For the full-scale development of science in the whole country, centralized servicing of the needs of scientific establishments must be organized. At the annual meeting on 2 February 1952, the creation of the Institute of Scientific Information was outlined. A decision had been adopted earlier to create the Calculation Center of the Academy of Sciences USSR to aid scientific work by machine calculation techniques. At the present time, the Institute of Scientific Information is publishing a large series of abstract journals, completely encompassing world scientific literature. These journals are on physics, chemistry, biochemistry, biology, mathematics, mechanics, geodesy, astronomy, geology and geography. Some 102,000 abstracts have already been published. The first two periodicals, entitled Elektrichestvo, radiotekhnika, i avtomatika (Electricity, Radio Engineering, and Automatics) and Mashinovedeniye (Machine Study) are being prepared for publication. Complete reference books will also be published and author catalogs have already appeared.

The Presidium of the Institute of Scientific Information has decided to issue a new publication on the basis of the abstract journals, entitled Itogi Nauki (Results of Science) in the form of systematic monographic surveys covering 2-3 years in the most rapidly developing branches of science. Besides this, the institute is already issuing nonperiodic surveys and translations on the most important questions in science and technology, and is increasing the number of available handbooks and periodic publications. Finally the question of machine information is also being developed, based on machines of the digital electronic type as well as others. The activity of the Institute of Scientific Information is also making scientific literature available for research in fields related to the sciences.

For many branches of science connected with cumbersome calculations, such as meteorology, mechanics and power engineering, structural analysis, etc., the opening of the Calculation Center will signify a sharp increase in productivity. The work of the center should start in 1955.

The various departments must formulate, and present to the presidium of the academy, proposals for the creation of additional establishments which centrally service scientific research. For example, biological research could use a laboratory for the synthesis of complex organic compounds with traced atoms. If biologists receive a good assortment of such compounds already prepared, instead of spending considerable amount of time and effort on their synthesis, the productivity of the scientific labor will rise.

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In scientific competition with other states, the USSR should strive for ability rather than quantity. Productivity of scientific labor plays a greater role in this field than it does in industry. Well-organized scientific work can always increase Soviet strength and success. In this regard, the initiative of the department is necessary. Well-organized, aiming at the solution of the most important problems in science, with a well-thought-out and proper division of labor, equipped with the most modern scientific production techniques, and with the well-harmonized work of the entire nation's scientific forces, the USSR will undoubtedly achieve first place in world science.

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